the observations, proportionally small variations in the elements producing greatly magnified effects upon the geocentric place and geocentric motion, in consequence of the close proximity of the comet.

Oppolzer describes his method of calculation in No. 1,938 of the *Astronomische Nachrichten*, to which we must refer the reader, as an outline of it would unnecessarily extend this note. He makes three assumptions as to the distance of the comet from the earth and deduces three orbits for comparison with the orbit of Biela's comet, as follow :—

	(A)	(B)	(C)	Orbit of Biela.
Distance assumed ...	0·04	0·08	0·12	—
	° ′	° ′	° ′	° ′
Mean anomaly	− 4 54·4	− 5 6·8	− 5 4·8	—
Long. of perihelion ...	128 48	141 9	151 50	109 45
,, ascending node	247 38	244 34	242 12	245 50
Inclination	9 14	10 28	11 46	12 22
Angle of excentricity..	51 36	54 17	56 49	48 48

It must be added that Oppolzer pre-supposes the comet moving in an orbit with same semi-axis major as that of Biela, the corresponding mean daily motion being 530″·1; hence with the above mean anomalies on December 3·0, the dates of perihelion passage on the three hypotheses would be respectively January 5·3, January 6·7, and January 6·5.

The similarity of these systems of elements is striking; only in the longitude of perihelion are there comparatively large differences, which Oppolzer observes, may not appear so noteworthy when it is remembered that Michez's elements do not include the effect of perturbations from 1866 to 1872, nor those which might just have resulted from the presumed exceedingly close approach of the comet to the earth on the night of the meteoric shower. The great difference of nearly three months in the perihelion passage, however, he regarded as against the identity of the object with Biela's comet, though from the anomalies which the disintegration of the comet might have occasioned, this circumstance might not really possess all its apparent signification. His general conclusions may be stated thus :—It may be asserted with confidence that assuming the distance of Pogson's comet from the earth December 3·0 to have been within the limits 0·04 and 0·12 of the earth's mean distance from the sun, we are led to elements which show a remarkable resemblance to those of Biela's comet, as well as with the course of the great shower of meteors on November 27, 1872. When the distance is much increased we find materially different elements, and the greater distance cannot be regarded as improbable; in this, Oppolzer remarks, lies in his opinion the weakest point of the argument, and only by observations at a future time can a certain conclusion be attained. Nevertheless he considers the striking coincidences following on arbitrary assumptions, taken together, militate strongly in favour of the approximate correctness of his assigned distance. Thus there seems to be under the above suppositions as to the comet's distance, a most remarkable connection with the meteor-shower of November 27. If, as a rough approximation, it is assumed that the comet at 8 P.M. on that day touched the earth, and further, that the differential daily variation of the distance within the $5\frac{2}{3}$ days was equable, an hypothesis, which in the case of a contact, will not differ much from the truth, there will be deduced from the three values, for the distance of the comet on December 3, respectively 0·061, 0·071, and 0·080; comparing these values with those assumed, it is seen at once that an agreement is established with the final value, when the distance = 0·07 nearly. This result Oppolzer urges as highly deserving of note, and in his opinion almost demonstrates the connection of the swarm of meteors with the comet. On the supposition that the true values of the elements must be sought between the systems (A) and (B), considering further that the earth on November 7·3 was in 65°·9, heliocentric longitude, and that the comet if it gave occasion to the meteor-shower must have been situate near its descending node, so the longitude of the node by this criterion would be 245°·9, a value which also falls between the limits (A) and (B).

Further, if the distance of the comet from the earth is calculated from the above elements for the time of the meteor-shower, the following series is formed :—

A	B	C
0·024	0·009	0·053

and it is seen that the assumption of 0·07 for the distance on December 3, leads to a very close approximation of the comet to the earth at the time of the shower. Calculating now the comet's radius-vector for November 27·3, the three systems give logarithmically—

A	B	C
0·0042	9·9950	9·9908

while the log. distance of the earth is 9·9940. Consequently with elements A and B the comet is a little outside the earth's orbit, and with elements C it would occupy a position within it. At the first glance it will appear probable that necessarily the last relation must have place, or the comet would certainly have been detected ere it reached its least distance from our globe. On the one side, from the uncertainty of the data for calculation, the results may be considerably in error, on the other there may be some probability that the comet was visible in the southern hemisphere, and we might have received intimation that a comet of great brightness and with rapid motion was there recognised. Calculating from the three systems of elements the geocentric place, there result—

	A	B	C
λ	67°	110°	180°
β	+11	− 75	− 25

so that, in fact, with the system B, which appears to approach nearest the truth, the circumstances of visibility for the southern hemisphere would be favourable.

Weighing all these circumstances, Oppolzer thought it must be granted that Pogson's comet stands with high probability in intimate relation with the meteor-shower of November 27, and that it is possible the observed object was one of the heads of Biela. That the second head was not found, is not decisive against this, since the same, on account of close proximity to the earth, might have been situate in an entirely different quarter of the heavens, and besides, from its greater relative distance, might have been considerably fainter, so as easily to escape detection. Thus, at the time of writing his paper on the subject, Oppolzer was of opinion that the connection of Biela's comet with Pogson's object and the meteor-shower was by no means to be regarded as improbable.

GEOGRAPHICAL NOTES

THE *Golos* publishes a telegram, dated the 13th of May, from the celebrated Central Asian traveller, M. Prjevalsky, formerly a colonel in the Russian army. At that time he was on the river Buluguna. He had marched 600 versts from Saisan along the river Urumtsu, and would immediately set out for Chemi through the southern Altai mountains. All the members of his expedition were in good health.

THE Alexandria correspondent of the *Daily News* sends some details of Major Serpa Pinto's recent journey across Africa from Benguela to Durban. He tells us little that has not been already made known, and we shall look with eagerness for Pinto's promised work. Science has evidently had considerable attention rom Major Pinto during his journey. He has brought home a collection of 1,800 plants and "a superb collection of birds and insects." Astronomical and meteorological observations have been taken along the route, and several volumes of notes made, with maps. The Coando, which flows into the Zambesi,

is stated to have a length of 600 miles. It says much for the enthusiasm, if not for the knowledge, of the *Daily News* correspondent that he places Major Pinto in the "first rank of African explorers."

THE International African Association have received letters from MM. Cambier and Dutrieux down to March 16. They state their intention of remaining at Tabora till the end of the *masika*, or rainy season, which commonly ceases at the beginning of May. M. Cambier says that he has established friendly relations with the Arabs, and that he has ample resources for the next year without further supplies being sent. He also advises having forwarded an entomological collection made by Dr. Dutrieux. Though intelligence respecting this unfortunate expedition is remarkably vague, it may be hoped that we shall before long hear of their having done some real work, as they are now well advanced into the interior, have ample supplies, and the proper travelling season before them. The Association's second expedition will probably not be long before they start for the interior, as MM. Popelin and Van den Heuvel were to arrive on May 29 at Zanzibar, whither they have been preceded by M. Dutalis, who has already been engaged in a preliminary examination of the River Wami.

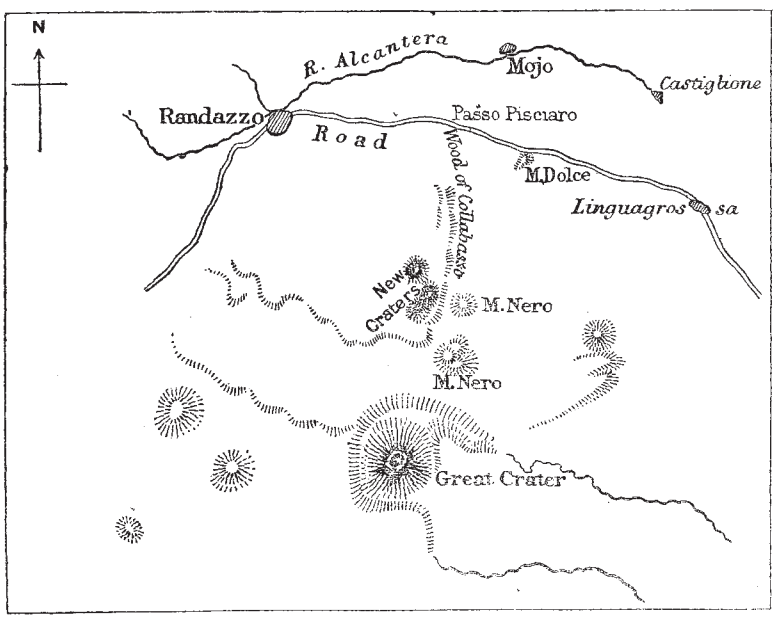
M. DE VILLIERS, the new Governor-General of French Cochin China, was Director of the Interior in Algiers under General Chanzy. He is the author of a dictionary of all the Algerian tribes and sub-divisions of tribes. This valuable work was published some years ago at the expense of the French Government.

THE current number of *Les Missions Catholiques* contains an account by Père Schmitt of a journey to Loango, in Western Africa.

THE new number of the *Annales de l'Extrême Orient* contains the first instalment of Dr. J. Harmand's "Notes de Voyage en Indo-Chine," illustrated by a map and copies of Khmer inscriptions. This is followed by part of a paper on New Guinea, in which is embodied much information respecting the Karons, the Kebars, and the Amberbaks. There are also some remarks by R. Friederich on the archæology and iconography of Java.

THE ERUPTION OF ETNA

ON the night of Sunday, May 25, loud bellowings were heard by the dwellers on the northern slopes of Etna. Towards the morning of the 26th these increased, and about midday a dense cloud of smoke was seen to issue from the side of the mountain below the great crater, apparently half way between Randazzo and Linguaglossa. This cloud increased, and on the 27th the mountain was rendered invisible, and an effect like that of an eclipse resulted. A rain of fine black ash, "like powdered emery," fell for miles around, and was so thick that Capo di Schiso could not be seen from Taormina, a distance of two miles. This black rain continued all day, accompanied by thundering noises from the mountain. No exact information could be procured concerning the position of the centre of disturbance, because no one could approach the new craters. During the night of the 27th the ashes continued to fall, and "huge fires could be seen looming through the black clouds"—no doubt the reflection of the molten lava on the smoke above it. It was reported in Piedemonte, a village on the north-



east flanks of Etna, that three craters about a mile apart had opened at the points of a triangle, about six miles above Passo Pisciaro, a posting station nearly midway between Randazzo and Linguaglossa. Lava was said to be flowing in a valley to the north of the Val del Bove. On the 28th a great stream of lava was seen from Taormina to be descending the mountain in the direction of Randazzo, "while from the new craters great balls of fire were thrown high in the air, and burst into showers of fire like gigantic rockets, accompanied by thundering explosions." On May 29 the lava was still flowing, but the shower of ash was diminished. The facts, as above stated, were witnessed by an Englishman living in Taormina, 800 feet above the sea, at the north-eastern termination of the flanks of Etna, about fifteen geographical miles from the new craters.

Daily bulletins in the newspapers have given us the history of the eruption since May 29. It is to be regretted that these have not been more concordant. Many times has the lava stream reached the bed of the river Alcantara, according to the telegrams, and often the next day has it been a kilometre distance. A telegram from Rome dated